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CLAIMS:

What is claimed is:

1. A method of balancing path usage over a plurality of paths from at least one first device to a plurality of second devices, comprising:

determining a total path usage for each of the plurality of paths; and

performing path balancing if a difference in a total path usage of a path having a highest path usage and a total path usage of a path having a lowest path usage is greater than a threshold usage amount.

2. The method of claim 1, wherein the path balancing includes:

identifying a highest path from the plurality of paths, the highest path having a highest total path usage;

identifying a lowest path from the plurality of paths, the lowest path having a lowest total path usage; and

calculating a difference between the total path usage of the highest path and the lowest path to form a calculated difference.

3. The method of claim 2, wherein each of the plurality of second devices is associated with at least one of the plurality of paths and wherein the path balancing

includes moving a second device from the highest path to the lowest path based on the calculated difference.

4. The method of claim 3, wherein the second device remains unmoved if a number of moved second devices is equal to or greater than a move limit.

5. The method of claim 3, wherein the second device that is moved is the second device from the plurality of second devices that has a usage amount closest to a target amount.

6. The method of claim 5, wherein the target amount is a fraction of the difference of the total path usage of the highest path and the lowest path.

7. The method of claim 1, wherein the total usage for each path is a function of the total usage for each second device associated with each path.

8. The method of claim 7, wherein the total usage for each second device is a function of a total number of input/output messages directed to each second device multiplied by the expected connect time for the input/output messages.

9. The method of claim 8, wherein the expected connect time for the input/output messages is based on the type of input/output message being sent.

10. The method of claim 1, wherein determining a total path usage for each of the plurality of paths includes sampling a number of I/O messages issued over each of the paths during a sampling period.

11. The method of claim 3, wherein moving the second device from the highest path to the lowest path based on the calculated difference includes changing address information for the second device.

12. The method of claim 4, wherein the move limit is set to one half the number of paths.

13. The method of claim 4, wherein if only one second device is associated with the highest path, movement of the one second device to the lowest path is prohibited.

14. A method of balancing communication path usage over a plurality of communication paths from at least one open system device to a plurality of peripheral devices, comprising:

calculating a total path usage for each of the plurality of communication paths;

identifying a highest communication path from the plurality of communication paths, the highest communication path having a highest total path usage;

identifying a lowest communication path from the plurality of communication paths, the lowest communication path having a lowest total path usage;

calculating a difference between the total path usage of the highest communication path and the lowest communication path to form a calculated difference; and

moving a peripheral device associated with the highest communication path from the highest communication path to the lowest communication path based on the calculated difference.

15. The method of claim 14, wherein the peripheral device remains unmoved if a number of moved peripheral devices is equal to or greater than a move limit.

16. The method of claim 14, wherein the peripheral device that is moved is the peripheral device from the plurality of peripheral devices that has a usage amount closest to a target amount.

17. The method of claim 16, wherein the target amount is a fraction of the difference of the total path usage of the highest communication path and the lowest communication path.

18. The method of claim 14, wherein the total usage for each communication path is a function of the total usage for each peripheral device associated with each communication path, respectively.

19. The method of claim 18, wherein the total usage for each peripheral device is a function of a total number of input/output messages directed to each peripheral device,

respectively, multiplied by the expected connect time for the input/output messages.

20. The method of claim 19, wherein the expected connect time for the input/output messages is based on the type of input/output message being sent.

21. The method of claim 14, wherein calculating a total path usage for each of the plurality of communication paths includes sampling a number of input/output messages issued over the plurality of communication paths during a sampling period.

22. The method of claim 14, wherein moving the peripheral device from the highest path to the lowest path based on the calculated difference includes changing address information for the peripheral device.

23. The method of claim 15, wherein the move limit is set to one half the plurality of communication paths.

24. The method of claim 15, wherein if there is only one peripheral device associated with the highest path, movement of the one peripheral device to the lowest path is prohibited.

25. A computer program product in a computer readable medium for balancing path usage over a plurality of paths from at least one first device to a plurality of second devices, comprising:

first instructions for determining a total path usage for each of the plurality of paths; and

second instructions for performing path balancing if a difference in a total path usage of a path having a highest path usage and a total path usage of a path having a lowest path usage is more than a threshold usage amount.

26. The computer program product of claim 25, wherein the second instructions further include:

instructions for identifying the highest path from the plurality of paths, the highest path having a highest total path usage;

instructions for identifying the lowest path from the plurality of paths, the lowest path having a lowest total path usage; and

instructions for calculating a difference between the total path usage of the highest path and the lowest path.

27. The computer program product of claim 26, wherein each of the plurality of second devices is associated with at least one of the plurality of paths and wherein the second instructions include instructions for moving a second device from the highest path to the lowest path based on the difference.

28. The computer program product of claim 25, wherein the first instructions include instructions for sampling

a number of I/O messages issued over each of the plurality of paths during a sampling period.

29. The computer program product of claim 27, wherein the instructions for moving the second device from the highest path to the lowest path based on the calculated difference includes instructions for changing address information for the second device.

30. A path balancing apparatus that balances the path usage over a plurality of paths from at least one first device to a plurality of second devices, comprising:

a controller that accumulates a total path usage for each of the plurality of paths; and

a path balancing device that performs path balancing if a difference in a total path usage of a path having a highest path usage and a total path usage of a path having a lowest path usage is more than a threshold usage amount.

31. The apparatus of claim 30, wherein the path balancing device performs path balancing by:

identifying a highest path from the plurality of paths, the highest path having a highest total path usage;

identifying a lowest path from the plurality of paths, the lowest path having a lowest total path usage; and

calculating a difference between the total path usage of the highest path and the lowest path.

32. The apparatus of claim 31, wherein each of the plurality of second devices is associated with at least one of the plurality of paths and wherein the path balancing device moves a second device from the highest path to the lowest path based on the difference.

33. The apparatus of claim 32, wherein the path balancing device does not move the second device if a number of moved second devices is equal to or greater than a move limit.

34. The apparatus of claim 32, wherein the second device that is moved by the path balancing device is the second device from the plurality of second devices that has a usage amount closest to a target amount.

35. The apparatus of claim 34, wherein the target amount is a fraction of the difference between the total path usage of the highest path and the lowest path.

36. The apparatus of claim 30, wherein the total usage for each path is a function of the total usage for each of the plurality of second devices associated with each path.

37. The apparatus of claim 36, wherein the total usage for each second device is a function of a total number of input/output messages directed to each second device multiplied by an expected connect time for the input/output messages.

38. The apparatus of claim 37, wherein the expected connect time for the input/output messages is based on the type of input/output message being sent.

39. The apparatus of claim 30, wherein the controller accumulates a total path usage for each of the plurality of paths by sampling a number of input/output messages issued over each of the paths during a sampling period.

40. The apparatus of claim 32, wherein the path balancing device moves the second device from the highest path to the lowest path based on the calculated difference by changing address information for the second device.

41. The apparatus of claim 33, wherein the move limit is set to one half the plurality of paths.

42. The apparatus of claim 33, wherein if there is only one second device associated with the highest path, movement by the path balancing device of the one second device to the lowest path is prohibited.

43. A path balancing system in which path usage over a plurality of paths from at least one first device to a plurality of second devices is balanced, comprising:

first means for accumulating a total path usage for each of the plurality of paths; and

second means for performing path balancing if a difference between a total path usage of a path having a

highest path usage and a total path usage of a path having a lowest path usage is more than a threshold usage amount.

44. The system of claim 43, wherein the second means performs path balancing by:

identifying a highest path from the plurality of paths, the highest path having a highest total path usage;

identifying a lowest path from the plurality of paths, the lowest path having a lowest total path usage; and

calculating a difference between the total path usage of the highest path and the lowest path.

45. The system of claim 44, wherein each of the plurality of second devices is associated with at least one of the plurality of paths and wherein the second means moves a second device from the highest path to the lowest path based on the difference.

46. The system of claim 45, wherein the second means does not move the second device if a number of moved second devices is equal to or greater than a move limit.

47. The system of claim 45, wherein the second device that is moved by the second means is the second device from the plurality of second devices that has a usage amount closest to a target amount.

48. The system of claim 47, wherein the target amount is a fraction of the difference of the total path usage of the highest path and the lowest path.

49. The system of claim 43, wherein the total usage for each path is a function of the total usage for each second device associated with each path.

50. The system of claim 49, wherein the total usage for each second device is a function of a total number of input/output messages directed to each second device multiplied by the expected connect time for the input/output messages.

51. The system of claim 50, wherein the expected connect time for the input/output messages is based on the type of input/output message being sent.

52. The system of claim 43, wherein the first means accumulates a total path usage for each of the plurality of paths by sampling a number of input/output messages issued over each of the paths during a sampling period.

53. The system of claim 45, wherein the second means moves the second device from the highest path to the lowest path based on the calculated difference by changing address information for the second device.

54. The system of claim 46, wherein the move limit is set to one half the plurality of paths.

55. The apparatus of claim 45, wherein if there is only one second device associated with the highest path, movement by the second means of the one second device to the lowest path is prohibited.